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54 **PAPER PIECE STORING DEVICE.**

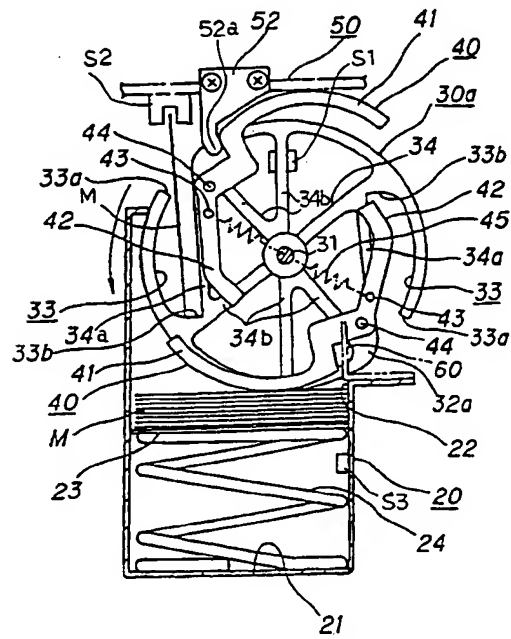
57 A paper piece storing device disposed in association with a conveying mechanism and having a paper piece storing container (20) for storing paper pieces being conveyed. This device includes a temporarily storing section (33), a rotatably displacing mechanism (30, 80) and a separating mechanism (60). The temporarily storing section (33) is adapted to receive paper pieces M being conveyed and stores them temporarily. The rotatably displacing

mechanism (30, 80) is adapted to rotatably displace the storing section, whereby the paper pieces stored in the storing section are led to a paper piece storing position of the paper piece storing container (20). The separating mechanism (60) prevents the paper pieces stored in the temporarily storing section from rotating against the operation of the rotatable displacing of the temporarily storing section and separates the paper pieces from the temporarily storing

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section at the paper piece storing position of the paper piece storing container.

FIG. 3



## TECHNICAL FIELD

This invention relates to a paper slip storage system for storing transported paper slips in a paper slip storage container and in particular to a paper slip storage system appropriate for storing bills, installed in a gaming house.

## TECHNICAL BACKGROUND

A conventional paper slip storage system is, for example, as shown in Figure 7.

When paper slips M are transported to a temporary storage section 1, they are pushed to the inside of a paper slip storage container 2 communicated with the temporary storage section 1 by means of a push plate 3 for performing a push operation from the outside to inside of the paper slip storage container 2. When the push plate 3 is restored to the outside, shutters 4 at the entrance of the paper slip storage container 2, which open and close prevent the paper slips from returning to the temporary storage section 1, so that they are kept inside the paper slip storage container 2. The paper slips in the paper slip storage container 2 are pushed towards the opening and closing shutters 4 by a paper slip pressure spring 5 so that the notes are properly arranged.

In such a conventional paper slip storage system, however, when paper slips M are stored in the paper slip storage container 2, the push plate 3 reciprocates between the outside and inside of the paper slip storage container 2, thus a space for the push plate 3 to reciprocate is required outside the paper slip storage container 2. For this reason, the installation space of the paper slip storage system becomes large. For example, to place such a paper slip storage system in the inside of a gaming machine island in a gaming house, a large space is required; effective use cannot be made of space.

## DISCLOSURE OF INVENTION

It is therefore an object of the invention to provide a paper slip storage system which only requires a compact space for installation so that effective use can be made of limited space.

To this end, according to one form of the invention, there is provided a paper slip storage system having a paper slip storage container being placed in conjunction with a transport mechanism for storing transported paper slips, wherein the improvement comprises:

a temporary housing section for receiving a transported paper slip and temporarily housing it;

a rotational displacement mechanism for rotationally displacing the temporary housing section for guiding the paper slip housed therein to a

paper slip storage position of the paper slip storage container; and

a separation mechanism for blocking rotation of the paper slip housed in the temporary housing section against operation of rotational displacement of the temporary housing section and separating the paper slip from the temporary housing section at the paper slip storage position of the paper slip storage container.

The rotational displacement mechanism can have a rotation body and a drive mechanism for rotationally driving the rotation body. For example, a rotation drum is used as the rotation body.

The temporary storage section can have a structure in which a length in a rotation shaft direction of the rotation body is shorter than a length in the same direction of a paper slip housed in the temporary storage section.

The temporary housing section can have a slit-like opening along an axial direction of the rotation body and a depth, when a paper slip is housed, sufficient to allow a part of the paper slip to protrude outward therefrom, wherein insertion of a paper slip is accepted from one end of the rotation body and the paper slip is discharged through the slit-like opening.

Also, a plurality of the temporary housing sections can be provided, in which case they are equally spaced on the rotation body, for example.

The separation mechanism can consist of a paper slip stop member for blocking tangential movement of a paper slip, the paper slip stop member being placed at a position abutting against a part of a paper slip protruding outward from the temporary housing section when the temporary housing section is at the paper slip storage position of the paper slip storage container. For example, two paper slip stop members can be provided and placed on both outsides of a rotation passage position of the temporary housing section.

The invention can further include a clamp mechanism for temporarily fixing and holding a paper slip housed in the temporary housing section while the paper slip is guided to the paper slip storage position of the paper slip storage container after it is received.

The invention can further include a first sensor for detecting the temporary housing section being at a position where it can receive a paper slip. The invention can further include a second sensor for detecting the temporary housing section housing a paper slip.

The invention can further include a controller which controls the drive mechanism so as to stop rotation of the rotation body upon receipt of a detection signal of the first sensor and controls the drive mechanism so as to rotate the rotation body upon receipt of a detection signal of the second

sensor.

The temporary housing section temporarily houses a transported paper slip. The rotational displacement mechanism rotates the housing section with the paper slip fixed by the clamp mechanism, for example, for guiding the paper slip to a paper slip storage position of the paper slip storage container. The separation mechanism blocks rotation of the paper slip housed in the temporary housing section against rotational displacement of the temporary housing section and separates the paper slip from the temporary housing section at the paper slip storage position of the paper slip storage container, whereby the paper slip is left at the paper slip storage position and stored in the paper slip storage container.

Therefore, according to the paper slip storage system of the invention, a space for only housing the rotational displacement mechanism would enable paper slips to be stored in the paper slip storage container. Thus, the installation space of the paper slip storage system can be made compact for effective use of space, which is particularly advantageous, for example, in the inside of a gaming machine island in which the paper slip storage system is installed.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

Figure 1 is a fragmentary longitudinal sectional view showing a paper slip storage system according to one embodiment of the invention;

Figure 2 is a plan view showing the paper slip storage system according to the embodiment of the invention;

Figure 3 is a transverse sectional view illustrating the operation of the paper slip storage system according to the embodiment of the invention;

Figure 4 is a transverse sectional view illustrating the operation of the paper slip storage system according to the embodiment of the invention;

Figure 5 is a transverse sectional view illustrating the operation of the paper slip storage system according to the embodiment of the invention;

Figure 6 is a transverse sectional view illustrating the operation of the paper slip storage system according to the embodiment of the invention;

Figure 7 is a schematic longitudinal sectional view showing a conventional example, and

Figure 8 is a transverse sectional view showing another example of a paper slip clamp mechanism.

#### BEST MODE FOR CARRYING OUT THE INVENTION

Referring now to the accompanying drawings, there is shown one embodiment of the invention.

As shown in Figures 1 to 3, a paper slip storage system 10 of the embodiment comprises a paper slip storage container 20 for stacking and storing paper slips transported by a paper slip transport mechanism 70, a rotation drum 30 having channels 33, each channel functioning as a temporary housing section, for receiving paper slips M from the paper slip transport mechanism 70 and rotationally displacing the channels 33 for guiding the paper slip M housed in the channel to a paper slip storage position of the paper slip storage container, paper slip stop members 60 functioning as a separation mechanism for blocking the paper slip M housed in the channel 33 so that the paper slip does not rotate further with rotational displacement of the rotation drum 30 and for separating the paper slip M from the temporary housing section at the paper slip storage position of the paper slip storage container 20, and a pair of pressure arm members 40 and 40 functioning as a clamp mechanism for pressing the paper slip M in the channel 33. The paper slip storage system of the embodiment also has the paper slip transport mechanism 70, a controller C which controls the rotation operation of the rotation drum, and sensors S1 and S2. The components of the embodiment are basically installed on a base A.

As shown in Figures 1 and 3, the paper slip storage container 20 is a container substantially like a rectangular parallelepiped having sides in the length direction of the container, one side being higher than the opposite side, a bottom 21, and an opening 22 provided in the upper end of the lower side. Paper pressure springs 24 are provided inside the container 20. The paper slip storage container 20 has an internal form which allows paper slips M such as bills to be housed with the slips stacked from the bottom 21 up to the opening 22 and an internal sectional area of at least a size which allows the paper slips to be housed with the slips spread out. The size of the opening 22 of the paper slip storage container 20 is represented by the length of the side in the length direction (lateral direction), c, and the length of the side in the direction (vertical direction) perpendicular to that side, a. (See Figure 2.)

A drive mechanism 80 consists of an electric motor 81, pulleys 82 and 83, and an endless belt 84. The electric motor 81 is fixed to a support bracket B mounted upright on the base A. The pulley 82 is fixed to a drive shaft 81a of the electric motor 81 and the pulley 83 is fixed to a spindle 31 of the rotation drum 30. The endless belt 84 is

placed on pulleys 82 and 43. The rotation drum 30 is rotated on the spindle 31 by power from the drive mechanism 80.

The rotation drum 30 is mounted on a frame-like bracket 50 that can be installed on the base A. The frame-like bracket 50 has a top face 51 and sides 53 and 53. The rotation drum 30 is placed so that the downward portion of a cylindrical face 32 faces the opening 22 of the paper slip storage container 20. Also, the rotation drum 30 is placed with the spindle 31 parallel to the length of the paper slip storage container 20. The spindle 31 is supported by the sides 53 and 53 so as to be able to rotate.

As shown in Figure 2, the rotation drum 30 has a diameter b longer than the vertical length of the paper slip storage container 20, a, and an axial length d shorter than the lateral length of the paper slip storage container 20, c. Therefore, in the embodiment, the rotation drum 30 is placed with a radial part of the drum sticking out from the paper slip storage container 20 in the horizontal direction, for example, as shown in Figure 3.

In the embodiment, the rotation drum 30 comprises two subdrums 30a and 30a combined on one shaft 31. A clearance for swingably housing a pair of pressure arm members 40 and 40 is formed between the subdrums 30a and 30a. The pressure arms 40 and 40 together with a plate member 52 serve as a clamp mechanism for restraining paper slips M.

The rotation drums 30 have two axial channels 33 and 33 each functioning as a paper slip housing section for temporarily housing a paper slip M. The channels 33 each have a discharge port 33a opened like a slit on the cylindrical face 32. Each channel 33 is formed over the axial length of the rotation drum 30. The channels 33 are communicated with one end 35 of the rotation drum 30 and a taking-in port 36 is formed at the end 35. The two channels 33 are at positions symmetrical with each other with respect to the rotation.

As shown in Figure 3, each channel 33 is located almost along the circumference of the rotation drum 30 from the discharge port 33a to channel bottom 33b. That is, in the embodiment, the circumference is divided into four equal parts and the insides of the circular arcs of the two opposed sectors of the four parts are used as the channels. The depth is smaller than the height of a housed paper slip M, but is made so as not to bend the paper slip. In the embodiment, it is designed to be about two thirds of the height of a paper slip M.

Each channel 33 is made up of the inner face of the rotation drum 30 and a separation plate 34a. The rotation drum 30 contains a plurality of radial reinforcing plates 34b formed integrally from the spindle 31 to the cylindrical face 32. The cylindrical

face 32 has a pressure part 32a like a curved surface formed on the boundary with the separation plate 34a.

The rotation drum 30 comprises two pressure arm members 40 and 40 corresponding to two channels 33 and 33. Each pressure arm member 40 is swingably supported by a shaft 44 in the side of the pressure part 32a at the inner end face where the subdrums 30a and 30a face each other. The pressure arm member 40 holds a paper slip so that it does not slip out of the channel 33.

The tip of one end of each pressure arm member 40 forms a working end 42 for clamping a paper slip M. The working end 42 is displaced between a hold position for pressing a paper slip M to the inner wall of the channel 33 and a release position overlapping the separation plate 34 for releasing the paper slip M. The tip of the other end of each pressure arm member 40 forms a cam end 41 for swingingly displacing the working end 42 between the hold and release positions. The cam end 41 extends like a curve along the cylindrical face 32 and engages a tip 52a of a plate member 52 (described below) to adjust the swinging of the working end 42. The cam end 41 is provided so that it can protrude outward from the cylindrical face 32 of the rotation drum 30.

A pin part 43 protrudes in the vicinity of the shaft 44 on the side of one end of each pressure arm member 40. A spring member 45 is extended between each pin member 43, 43 and a hub 31a of the spindle 31. The spring member 45 urges the working end 42 of each pressure arm member 40 in the direction of the release position.

The plate member 52 engaging the end margin of the cam end 41 of the pressure arm member 40 is locked on the top face 51 of the frame-like bracket 50. The end margin of the cam end 41 of the pressure arm member 40 engages the tip 52a of the plate member 52, whereby the cam end 41 of the pressure arm member 40 is pushed to the inside of the rotation drum 30 and the working end 42 is displaced and fixed to the hold position for temporary regulation.

As shown in Figure 3, the paper slip stop members 60 are located at position which block passage of a paper slip M housed in the channel 33, on both sides of the rotation drum 30, at the upper end of the side of the paper slip storage container 20 from which the rotation drum 30 projects. The paper slip stop member 60s are at positions, when the rotation drum 30 rotates, striking against a paper slip M in the channel 33 moving with the rotation of the rotation drum 30, thus blocking the movement of the paper slip M, whereby the paper slip M is stored in the paper slip storage container 20.

The paper slip pressure springs 24 are two coil springs urging to the opening 22 side so as to press paper slips M in the paper slip storage container 20 towards the rotation drum 30 side and are located on the full bottom 21 of the paper slip storage container 20. A paper slip holding plate 23 parallel to the bottom 21 is locked on the top end of the paper slip pressure springs 24.

As shown in Figure 1, the paper slip transport mechanism 70 has an endless belt 71, pulleys 72, a roller 73, transport rollers 74, and a paper slip transport passage 75. The endless belt 71, which is placed on the pulleys 72, is parallel to the bottom 21 of the paper slip storage container 20 and is slanting.

The roller 73 is placed so as to abut against the endless belt 71 at the position of the pulley 72. It is fixed to a rotation shaft 73a. Several pairs of transport rollers 74 are placed along the endless belt 71 with the endless belt 71 between them. The paper slip transport passage 75 is formed along the endless belt 71 and communicated with the taking-in port 36 of the channel 33.

As shown in Figure 1, a drive 73b such as a motor for rotationally driving the rotation shaft 75a is connected to the rotation shaft 75a. The drive 73b, which is included in the transport mechanism, is controlled by the controller C (described below) for functioning so as to push a paper slip into the channel 33 of the rotation drum 30.

The sensor S1 consists of a proximity switch, etc., for sensing whether or not the channel 33 is at a position where a paper slip can be received from the transport mechanism. Specifically, it can be made of a magnetic sensor, a microswitch, or the like. To use a magnetic sensor, a magnet or the like is fitted to a specific position of the end of the drum and when the magnet reaches the specific position, the magnetic sensor senses it and detects angular displacement of the rotation drum and the position of the channel 33. To use a microswitch, a protrusion is provided at a specific position of the end of the rotation drum and when the protrusion reaches the specific position, the microswitch operates in response to it.

Preferably, at least two sensors S1 are placed at different angle positions for accurately stopping the rotation drum 30. That is, preferably the rotation drum can be controlled so that it decelerates at the first angle position and stops at the second position.

The sensor S2 is located on the outside of one end of the rotation drum 30, that is, the end of the side where the taking-in port does not exist for sensing whether or not a paper slip M is housed in the channel 33. For example, the sensor S is made of a photo interrupter. The photo interrupter consists of a light emitting element and a light receiv-

ing element opposed to it and detects an obstacle by using the fact that the obstacle would hinder light from the light emitting element from being incident on the light receiving element. In the embodiment, a paper slip corresponds to the obstacle.

A sensor S3 is installed in the paper slip storage container 20 for detecting a given amount of paper slips being housed in the paper slip storage container 20. Specifically, for example, a microswitch may be placed on the inner wall of the paper slip storage container 20 so that when the paper slip pressure springs 24 are pressed and displaced and the displacement reaches a given amount, a part of the spring comes into contact with the microswitch.

The controller C is made of, for example, a microcomputer and controls driving of the drive mechanism 80 of the rotation drum 30 and the drive 73b of the transport mechanism 70 based on information from the sensors S1 and S2.

Next, the function of the embodiment will be discussed.

In Figures 3 to 6, a sequence in which the paper slip storage system 10 stores paper slips M is shown in stages.

As shown in Figures 1 and 3, when the rotation drum 30 approaches an angle at which the channels 33 of the rotation drum 30 become vertical positions, the sensor S1 detects it. When receiving a detection signal of the sensor S1, the controller C stops the motor 81 of the drive mechanism 80 and starts the drive 73b of the paper slip transport mechanism 70, whereby a paper slip M moves together with movement of the endless belt 71 and enters the channel 33 through the taking-in port 36 of the channel 33, whereby the rotation drum 30 takes the paper slip M transported on the paper slip transport passage 75 into the channel 33 through the taking-in port 36 for housing it. At this time, the working end 42 of the pressure arm member 40 corresponding to the channel 33 in which the paper slip M is housed is placed at the release position by urging force of the spring member 45 and therefore the pressure arm member 40 does not hinder the paper slip M from entering the channel 33.

When the paper slip M is housed completely in the channel 33, the sensor S2 detects it and its detection signal is sent to the controller C. Upon receipt of the signal, the controller C stops the drive 73b and starts the drive motor 81.

Next, the drive mechanism 80 shown in Figure 1 causes the electric motor 81 to rotate the spindle 31 of the rotation drum 30 in the arrow direction shown in Figure 3 via the drive shaft 81a, the pulley 82, the endless belt 84, and the pulley 83. That is, powered by the drive mechanisms 80, with the paper slip M housed in the channel 33, the

rotation drum 30 rotates on the spindle 31 in the direction with the channel bottom 33b of the channel 33 leading and the taking-in port 33a thereof trailing (counterclockwise).

When the rotation drum 30 rotates about 45 degrees counterclockwise from the angle shown in Figure 3, it will be placed at the position shown in Figure 4. At this time, the cam end 41 of the pressure arm member 40 engages the tip 52a of the plate member 52 and is pushed into the inside of the rotation drum 30. Therefore, the working end 42 of the pressure arm member 40 is angularly displaced clockwise on the shaft 44 corresponding to the angular displacement of the pressure arm member 40, whereby the working end 42 reaches the hold position against the urging force of the spring member 45. In this condition, the working end 42 presses the paper slip M against the inner wall of the channel 33 to clamp it, thereby preventing the paper slip M in the channel 33 from slipping out as the rotation drum 30 rotates.

Subsequently, when the rotation drum 30 rotates to the position shown in Figure 5, the paper slip M caught in the channel 33 is moved to the opening 22 of the paper slip storage container 20 and placed at a position parallel to the paper slip holding plate 23 of the paper slip storage container 20. At this time, the cam end 41 of the pressure arm member 40 is detached from the tip 52a of the plate member 52. Thus, the working end 42 of the pressure arm member 40 is angularly displaced counterclockwise on the shaft 44 by the urging force of the spring member 45, whereby the working end 42 is placed away from the hold position and reaches the release position, releasing the pressure on the paper slip M.

Further, when the rotation drum 30 rotates to the angle shown in Figure 6, the paper slip stop member 60 strikes against the paper slip M in the channel 33 on the side of the paper slip storage container 20 where the rotation drum 30 protrudes, and passage of the paper slip M is blocked. As the rotation drum 30 further rotates, the channel 33 rotates, but rotation of the paper slip M is blocked by the paper slip stop member 60, and is thus discharged through the discharge port 33b of the channel 33 and remains in the paper slip storage container 20.

The paper pressure springs 24 press the paper slips M stacked in the paper slip storage container 20 towards the side of the rotation drum 30. When the rotation drum 30 rotates to the angle shown in Figure 6, it presses the paper slip M by means of the pressure part 32a and puts it between the cylindrical face 32 and the paper slip pressure springs 24 to stack it on the paper slips M in the paper slip storage container 20.

Thus, as the rotation drum 30 rotates, the paper slip M1 slips out of the discharge port 33b of the channel 33 and is stored in the paper slip storage container 20. At this time, the paper slip pressure springs 24 press the paper slips M in the paper slip storage container 20 towards the side of the rotation drum 30, and thus the paper slips M can be arranged properly.

When the rotation drum 30 rotates 180 degrees from the angle in Figure 3, the other channel 33 is set to a condition in which it can receive another paper slip M from the paper slip transport mechanism 70. After this, the same operation as described above is performed.

When the rotation drum 30 thus rotates to stack the paper slips in the paper slip storage container 20, their weight causes the springs 24 to be compressed. Compression of the springs causes a part thereof to come in contact with the sensor S3, which then detects it and sends a detection signal to the controller C. When receiving this signal, the controller C stops the drive 73b and the drive motor 81. When the paper slips M in the paper slip storage container 20 are discharged from the container 20, the same operation as described above is repeated.

Thus, a space for only housing the rotation drum 30 would enable the rotation drum 30 to smoothly store paper slips in the paper slip storage container 20. Therefore, according to the invention, the installation space of the paper slip storage system can be made compact for effective use of space such as the inside of a gaming machine island in which the paper slip storage system is installed.

In the embodiment, the system includes two channels for housing paper slips, but one or three or more channels may be provided. In addition to paper such as bills and slips, flexible cards, etc., may be transported in the place of the paper slips.

Although the rotation drum is used in the embodiment, the invention is not limited to the drum. The paper slip housing portion (in the embodiment, the channels) needs only to be able to be angularly displaced to send a received paper slip to a storage container at a different angle position. Therefore, a basket or the like may be used in place of the channel to be rotated.

In the embodiment, the system comprises the rotation drum divided into two subdrums, but the invention is not limited to it. For example, a single drum or more than three subdrums can also be used.

Although a paper slip is inserted into the channel from the axial direction of the rotation drum in the embodiment, it may be inserted into the channel from the circumferential direction of the rotation drum.

In the embodiment, the pressure arm members 40 and 40 are used to clamp paper slips M. However, the invention is not limited to it. For example, pins 91 which can protrude and withdraw as desired in the channels 33 and a mechanism, such as solenoids 92, serving as a drive mechanism for driving protrusion and withdrawing of the pins are provided, as shown in Figure 8. The solenoids 92 are controlled by the controller C so as to protruded and withdrawn in response to the rotation angle positions of the channels.

### Claims

1. A paper slip storage system having a paper slip storage container being placed in conjunction with a transport mechanism for storing transported paper slips, wherein the improvement comprises:
  - a temporary housing section for receiving a transported paper slip and temporarily housing it;
  - a rotational displacement mechanism for rotationally displacing the temporary housing section for guiding the paper slip housed therein to a paper slip storage position of the paper slip storage container; and
  - a separation mechanism for blocking rotation of the paper slip housed in said temporary housing section against operation of rotational displacement of said temporary housing section and separating the paper slip from said temporary housing section at the paper slip storage position of the paper slip storage container.
2. The paper slip storage system as claimed in claim 1 wherein said rotational displacement mechanism has a rotation body and a drive mechanism for rotationally driving said rotation body.
3. The paper slip storage system as claimed in claim 2 wherein said temporary storage section has a length in a rotation shaft direction of said rotation body, shorter than a length in the same direction of a paper slip housed in said temporary storage section.
4. The paper slip storage system as claimed in claim 3 wherein said separation mechanism consists of a paper slip stop member for blocking tangential movement of a paper slip, said paper slip stop member being placed at a position abutting against a part of a paper slip protruding outward from said temporary housing section when said temporary housing section is at the paper slip storage position of said paper slip storage container.
5. The paper slip storage system as claimed in claim 4 further including a clamp mechanism for temporarily fixing and holding a paper slip housed in said temporary housing section while the paper slip is guided to the paper slip storage position of said paper slip storage container after it has been received.
6. The paper slip storage system as claimed in claim 5 wherein two paper slip stop members are provided and placed on both sides of a rotation passage position of said temporary housing section.
7. The paper slip storage system as claimed in claim 5 wherein said temporary housing section has a slit-like opening along an axial direction of said rotation body and a depth, when a paper slip is housed, to allow a part of the paper slip to protrude outward therefrom, wherein insertion of a paper slip is accepted from one end of said rotation body and the paper slip is discharged through the slit-like opening.
8. The paper slip storage system as claimed in claim 7 wherein a plurality of said temporary housing sections are equally spaced on said rotation body.
9. The paper slip storage system as claimed in claim 2 further including a first sensor for detecting said temporary housing section being at a position where it can receive a paper slip.
10. The paper slip storage system as claimed in claim 9 further including a second sensor for detecting said temporary housing section housing a paper slip.
11. The paper slip storage system as claimed in claim 10 further including a controller which controls the drive mechanism so as to stop rotation of said rotation body upon reception of a detection signal from said first sensor and controls the drive mechanism so as to rotate said rotation body upon reception of a detection signal from said second sensor.
12. The paper slip storage system as claimed in claim 11 wherein said controller outputs a signal externally for sending out the paper slip to said temporary housing section, upon reception of the detection signal from said first sensor.



13. The paper slip storage system as claimed in claim 12 further including a third sensor for detecting paper slips stored in said paper slip storage container reaching a specific amount and sending a detection signal to said controller. 5
14. The paper slip storage system as claimed in claim 13 wherein said paper slip storage container has a pressure spring for pressing paper slips stored therein in a direction of said rotation body. 10
15. The paper slip storage system as claimed in claim 14 wherein said third sensor detects compression of said pressure spring for detecting the paper slips reaching the specific amount. 15
16. The paper slip storage system as claimed in claim 2 wherein said rotation body is made of a rotation drum and said temporary housing section is a channel provided on said rotation drum. 20
17. The paper slip storage system as claimed in claim 16 wherein said rotation drum comprises a plurality of separate subdrums combined axially, further including in at least one of gaps between the subdrums, a clamp mechanism for temporarily fixing and holding a paper slip housed in said channel while the paper slip is guided to the paper slip storage position of said paper slip storage container after it has been received. 25 30 35
18. The paper slip storage system as claimed in claim 17 wherein said clamp mechanism has an arm member, being swingably supported by at least one of the subdrums for releasably restraining the paper slip housed in said channel, and a cam mechanism for causing said arm member to press and release according to rotation angle positions of said channel. 40 45
19. The paper slip storage system as claimed in claim 18 wherein said separation mechanism consists of a paper slip stop member for blocking tangential movement of a paper slip, said paper slip stop member being placed at a position abutting against a part of a paper slip protruding outward from said temporary housing section when said temporary housing section is at the paper slip storage position of said paper slip storage container. 50 55
20. The paper slip storage system as claimed in claim 19 wherein two paper slip stop members are provided and placed on both sides of said rotation body.

FIG. 1

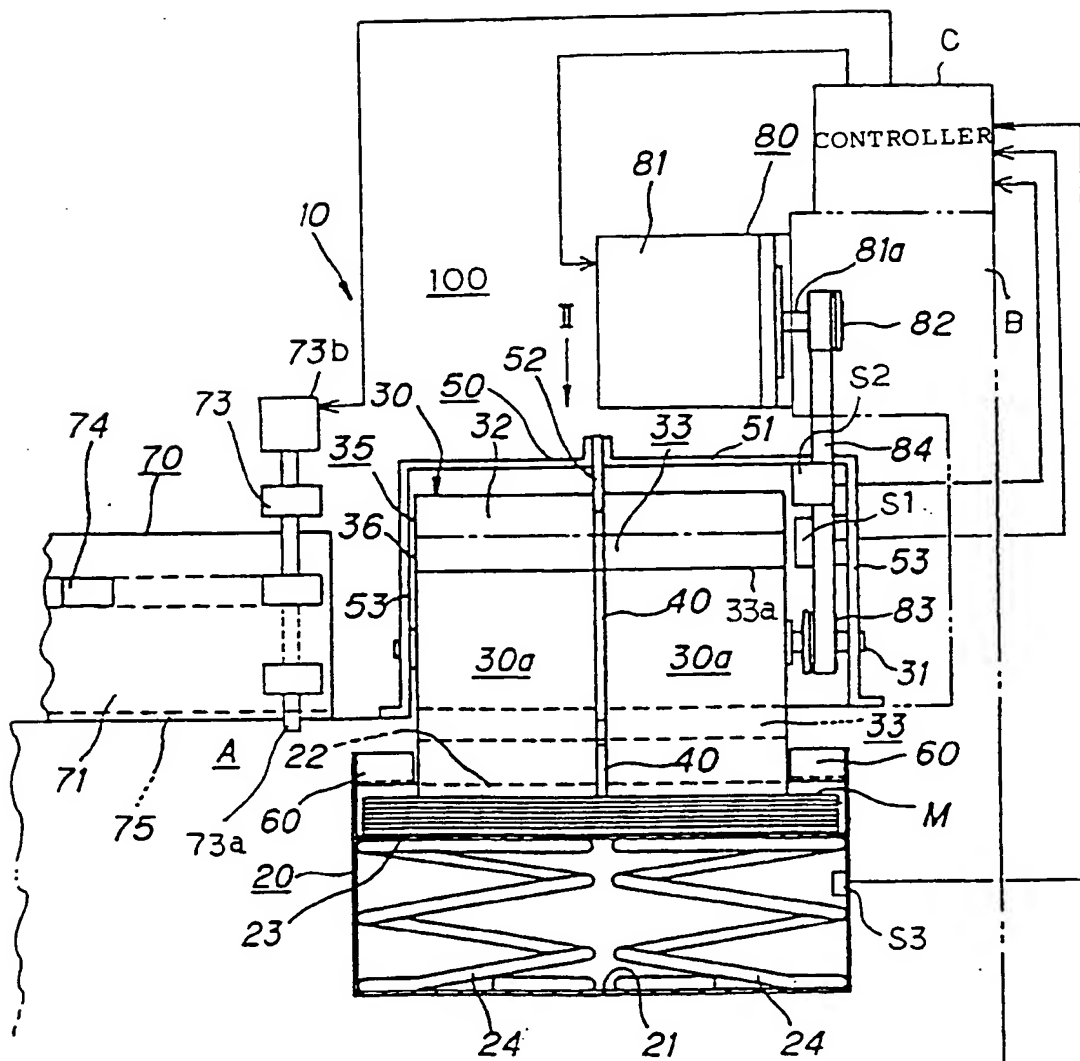


FIG. 2

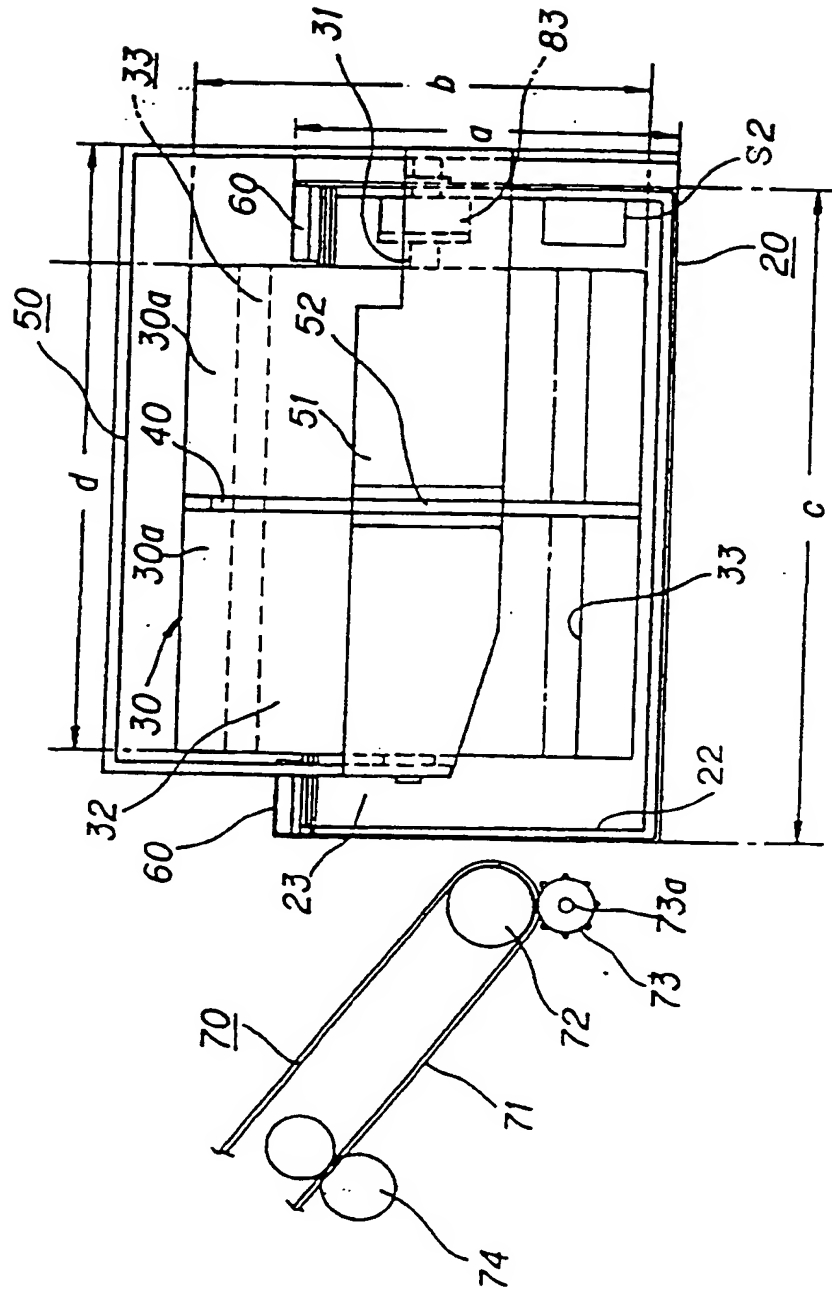


FIG. 3

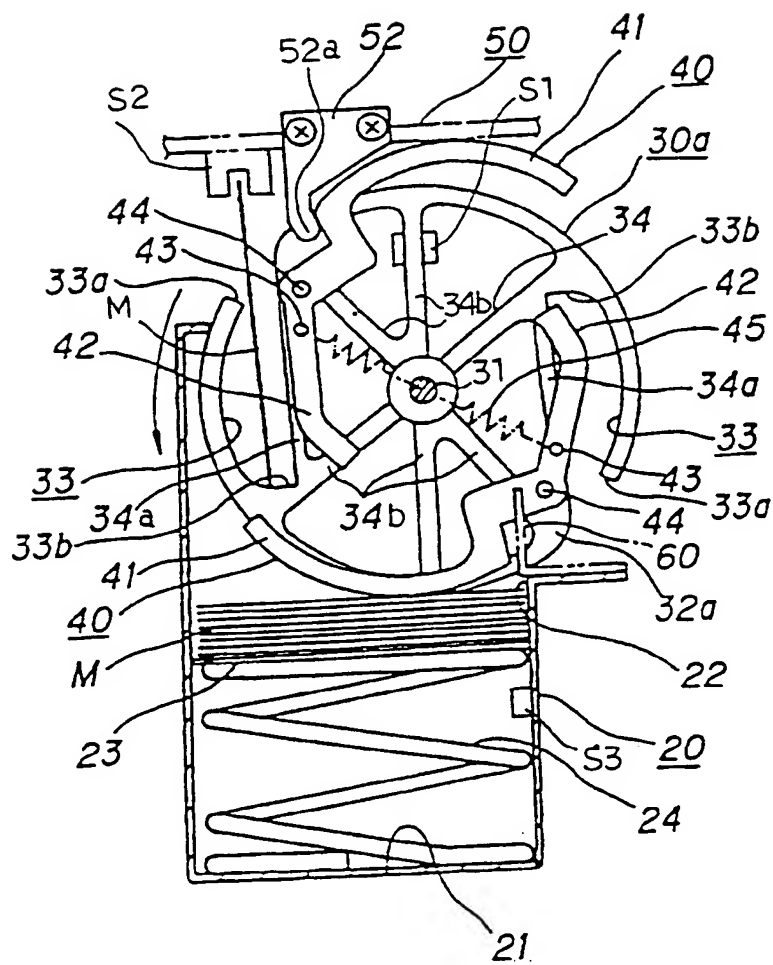


FIG. 4

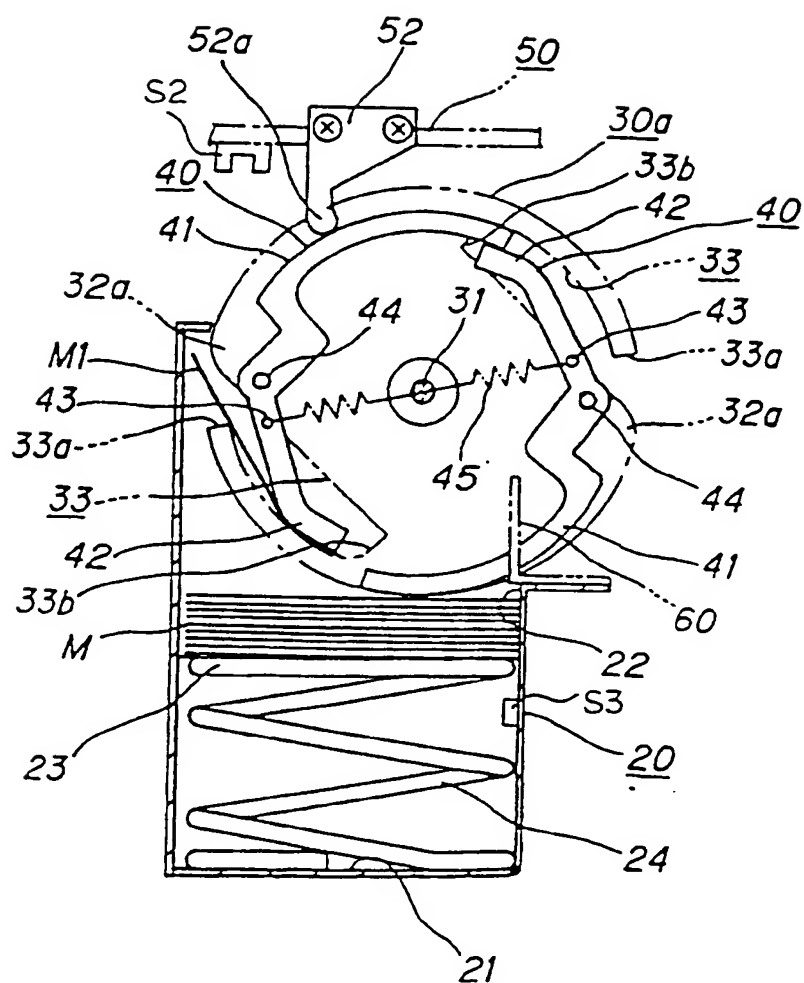


FIG. 5

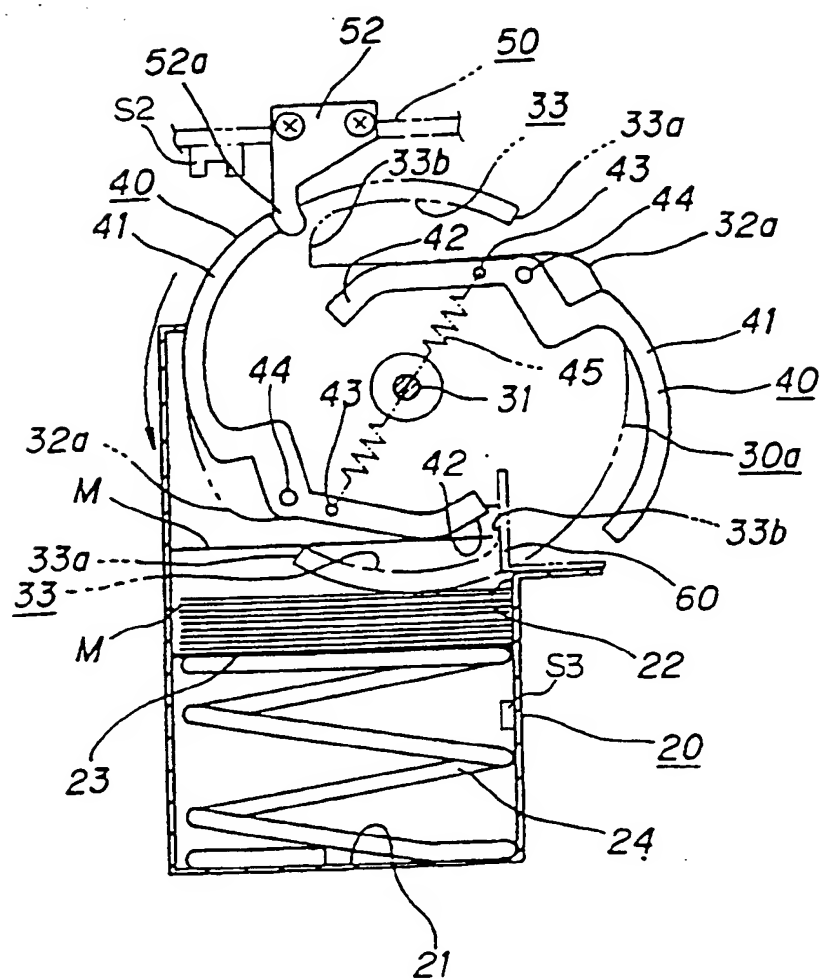


FIG. 6

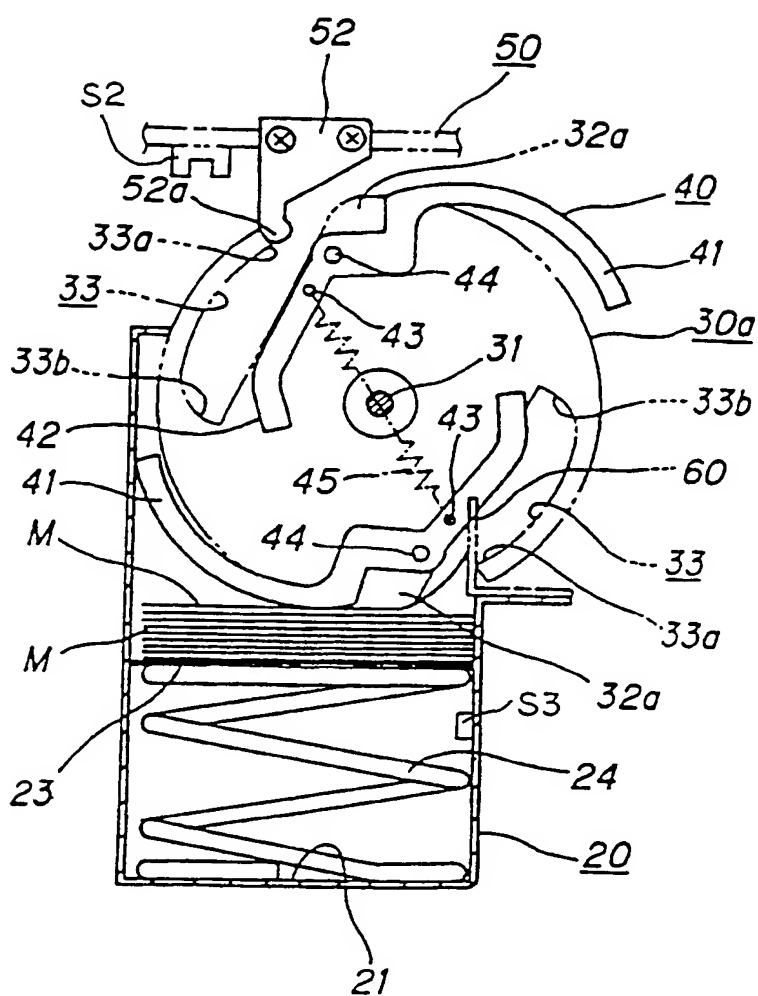


FIG. 7

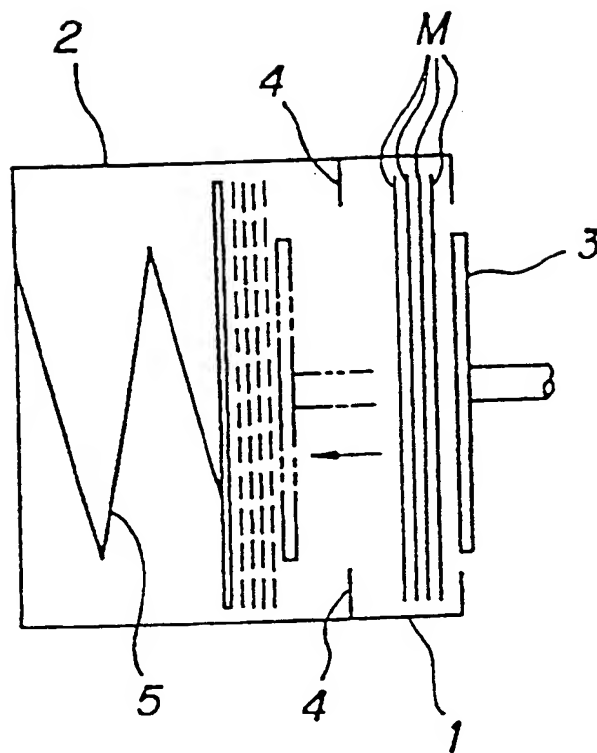
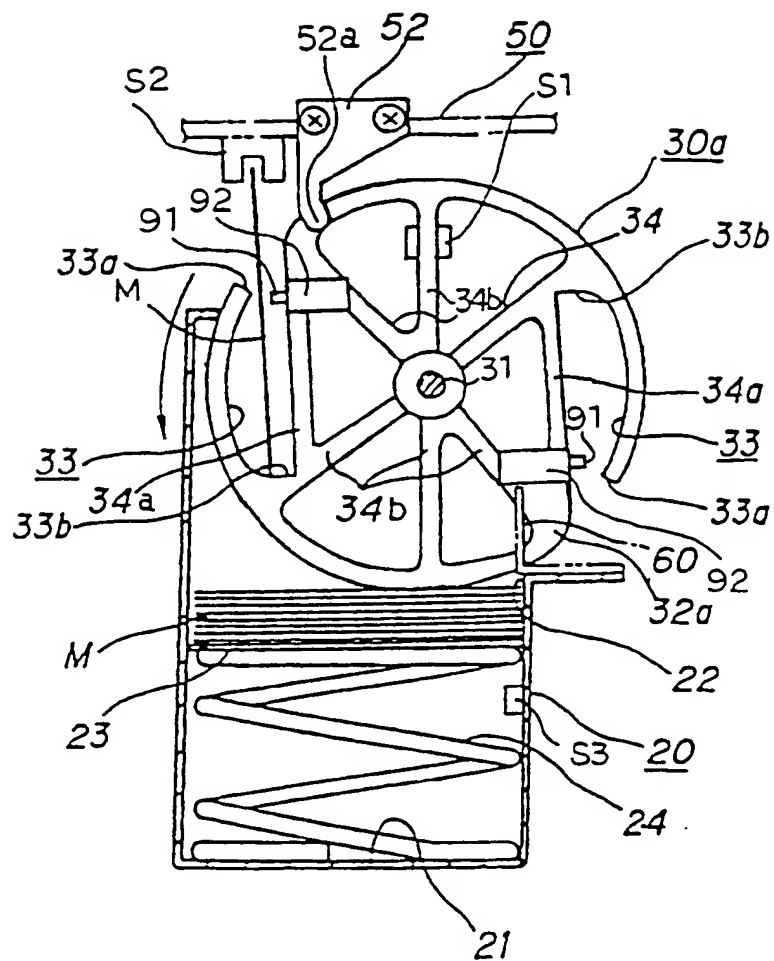




FIG. 8



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP93/00701

A. CLASSIFICATION OF SUBJECT MATTER		
Int. Cl <sup>5</sup> B65H29/40		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
Int. Cl <sup>5</sup> B65H29/40, B65H31/00, B65H31/24		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Jitsuyo Shinan Koho 1926 - 1993 Kokai Jitsuyo Shinan Koho 1971 - 1993		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP, B1, 46-9285 (Hitachi, Ltd., Keihin Hitachi Engineering K.K.), March 9, 1971 (09. 03. 71)	1, 2 3-20
Y	JP, A, 57-27857 (Toshiba Corp.), February 15, 1982 (15. 02. 82), (Family: none)	3-8, 19, 20
Y	JP, A, 58-212546 (Toshiba Corp.), December 10, 1983 (10. 12. 83), (Family: none)	6, 20
Y	JP, A, 61-150959 (Toshiba Corp.), July 9, 1986 (09. 07. 86), (Family: none)	9-15
Y	JP, A, 51-141697 (Oki Electric Industry Co., Ltd.), December 6, 1976 (06. 12. 76),	10-20
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
June 11, 1993 (11. 06. 93)		July 6, 1993 (06. 07. 93)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP93/00701

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	& JP, B2, 54-38383	
Y	JP, A, 64-53983 (Nitto Denko K.K.), March 1, 1989 (01. 03. 89)	12-15
Y	JP, A, 63-117874 (Fujitsu Ltd.), May 21, 1988 (21. 05. 88), (Family: none)	13-15
Y	JP, B2, 57-2625 (International Business Machines Corp.), January 18, 1982 (18. 01. 82), & EP, A1, 21398 & US, A, 4252309	16-20

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

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(2)

## MULTI-PASS PRINTING WITH AUTOMATIC PAPER FEEDING

G. L. Douglas

This technique eliminates the need for operator ordering of document pages between multiple printing passes, and prompts the operator as to required print elements in a multi-pass printing job.

Multi-pass printing is used on printers having changeable print elements. A first printing pass is made with one print element having some of the characters or symbols to be printed, and additional passes are necessary when the print element must be changed to accommodate other symbols or characters not included on the first print element. A problem arises when doing multi-pass printing using a collating sheet feed device with the printer in which the pages of the printed job are stacked face up with the first page on the bottom of the stack and the last page on top. If the operator places this stack in the input hopper of the sheet feed device for the second printing pass, the pages are in reverse order for the second printing pass, assuming that the pages are fed from the top of the stack. Accordingly, additional operator time is required to reorder the pages of the job so that the first page is on top and the last page is on the bottom before the second printing pass can take place. This additional operator requirement is eliminated by fetching the data to be printed in reverse page order for all even numbered passes in a multiple-pass printing job. Thus, data is fetched in reverse page order for second, fourth, sixth, etc., passes while on third, fifth, etc., passes the pages are printed in first page to last page order. Odd numbered passes after the first pass receive the sheets in correct order and, therefore, it is not necessary to fetch the data for printing in reverse page order.

Using this technique, with each pass of a multi-pass printing job using a particular printer element, and each pass properly handling the paper, the only operator involvement is changing the print element for each pass and moving the stack of paper from the output hopper to the input hopper.

An additional choice is provided on the Print Document menu associated with a text processing system configured for multi-pass printing. With this choice the operator indicates to the system that "none" of the pages, "few" of the pages, or "many" of the pages of the job require multiple printing passes. If none of the pages require more than one printing pass, the job is not a multi-pass job. If the operator specifies that "many" pages require multi-pass printing, the multi-pass operation cycles all of the sheets for the print job through the machine for each printing pass, even though some pages may have no printing operations beyond the first pass. If "few" was the operator's

MULTI-PASS PRINTING WITH AUTOMATIC PAPER FEEDING - Continued

choice, the system remembers which pages need additional printing passes and prompts the operator to submit these pages separately when the specified print wheel has been mounted for subsequent printing passes. Then, only these few selected pages are cycled through the printer as many times as necessary to complete the printing.